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## AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of designing a metamaterial structure having a required permeability at a predetermined frequency, the metamaterial structure including a frequency selective surface located proximate to an electrically conductive layer, the method comprising:

relating the required permeability to a required surface impedance of the ~~apparatus~~ metamaterial structure at the predetermined frequency,

the required permeability being equal to the required surface impedance divided by an intrinsic impedance of free space, a propagation constant of free space, and a thickness $d$ of an equivalent electrical conductor backed magnetic film having the required permeability; and

configuring the metamaterial structure so as to obtain the required surface impedance, the apparatus thereby having the required permeability.

2. (Currently Amended) The method of claim 1, wherein the required permeability includes a required real permeability denoted $\mu_r'$, the required surface impedance includes a required surface reactance denoted $X_{S1}$, the required real permeability being related to the required surface reactance using the equation

$$\mu_r' = \frac{X_{S1}}{\eta_0 \beta_0 d}$$

where $\eta_0$ is the intrinsic impedance of free space, and $\beta_0$ is the propagation constant of free space.

3. (Currently Amended) The method of claim 1, wherein the required permeability includes a required imaginary permeability denoted $\mu_r''$, the required surface impedance includes a required surface resistance denoted $R_{S1}$, the required imaginary permeability being related to the required surface resistance by the equation.

$$\mu_r'' = \frac{R_{S1}}{\eta_0 \beta_0 d}$$

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where $\eta_0$ is the intrinsic impedance of free space, and $\beta_0$ is the propagation constant of free space.

4. (Currently Amended) The method of claim 1, wherein configuring the metamaterial structure so as to obtain the required surface impedance includes selecting [[a]] the frequency selective surface ~~having~~ to have a resonance frequency proximate to the predetermined frequency.

5. (Original) The method of claim 1, wherein configuring the metamaterial structure so as to obtain the required surface impedance includes optimizing the frequency selective surface using an optimization algorithm.

6. (Original) The method of claim 5, wherein the optimization algorithm is a genetic algorithm.

7. (Original) The method of claim 1, wherein the frequency selective surface is disposed on a first side of the a dielectric substrate, and the electrically conductive layer is disposed on a second side of the dielectric substrate, the dielectric substrate having a dielectric thickness substantially less than the wavelength of electromagnetic radiation at the predetermined frequency.

8. (Original) An electromagnetic device including the metamaterial structure designed by the method of claim 1.

9. (Currently Amended) A method of designing a metamaterial structure having ~~the properties~~ a permeability property of a ferrite film supported on a conducting ground plane, the metamaterial structure including a high impedance frequency selective surface, the method comprising:

specifying a required permeability of the metamaterial structure; and

relating [[a]] the required permeability of the metamaterial structure to a surface impedance of the metamaterial structure,

the required permeability having a required real component of permeability denoted $\mu_r'$, the surface impedance having a surface reactance denoted $X_{s1}$, wherein

$$\mu_r' = \frac{X_{S1}}{\eta_0 \beta_0 d},$$

where $\eta_0$ is the intrinsic impedance of free space, $\beta_0$ is the propagation constant of free space, and $d$ is the thickness of the ferrite film.

the value of surface reactance being chosen so as to provide the required real component of permeability.

10. (Original) The method of claim 9, wherein the required permeability further includes a required imaginary component $\mu_r''$, the required surface impedance having a surface resistance $R_{S1}$, wherein

$$\mu_r'' = \frac{R_{S1}}{\eta_0 \beta_0 d}$$

the value of surface resistance being chosen so as to provide the imaginary component of permeability.

11. (Currently Amended) The method of claim 9, wherein the value of surface reactance is chosen using electromagnetic modeling of the metamaterial structure, the metamaterial structure being configured to provide the value of surface reactance.

12. (Original) The method of claim 11, wherein an optimization algorithm is used to configure the metamaterial structure so as to provide the value of surface reactance.

13. (Currently Amended) The method of claim [[11]] 12, wherein the optimization algorithm is a genetic algorithm.

14. (Original) The method of claim 9, wherein the required real component of permeability is negative.

15. (Currently Amended) A structure providing a required permeability at ~~a predetermined~~ an

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operating frequency, the structure comprising:

a dielectric substrate, having a first side and a second side, and having a dielectric thickness and a dielectric constant;

an electrically conducting layer disposed on the first side of the dielectric substrate; and

a frequency selective surface disposed on the second side of the dielectric substrate,

the structure having a surface impedance,

wherein the surface impedance of the structure at the operating frequency is selected so as to provide the required permeability,

the required permeability being equal to the surface impedance divided by an intrinsic impedance of free space, a propagation constant of free space, and a thickness $d$ of an equivalent electrical conductor backed magnetic film having the required permeability.

16. (Original) The structure of claim 15, wherein the frequency selective surface includes a two-dimensional array of conducting elements.

17. (Currently Amended) The structure of claim 16, wherein the structure has the permeability properties of a ferrite film backed by a perfect electrical conductor,

the operating frequency being greater than 1 GHz..

18. (Canceled)

19. (Original) The structure of claim 15, wherein the structure is an electromagnetic absorber.

20. (Original) An antenna including the structure of claim 15.

21. (Original) A microwave device including the structure of claim 15.